Amendment and Response
Applicant: Darrel R. Bloomquist et al.
Serial No.: 10/080,847
Filed: Feb. 2, 2002
Docket No.: 10013884-1
Title: IN-PLANE TOROIDAL MEMORY CELL WITH VERTICALLY STEPPED CONDUCTOR

IN THE CLAIMS

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of the claims:

1.   (Currently Amended) A write conductor layout for a magnetic random access memory device comprising:

a toroid-like memory cell having an axial opening aligned with a first axis;

a first conductor passing through the axial opening of the memory cell; and

a second conductor passing through the axial opening of the memory cell;

wherein the first and second conductors extend in generally orthogonal directions with respect to each other, and wherein the first and second conductors each have a stepped portion which is aligned with the first axis as they pass through the axial opening of the memory cell.

2.   (Original) The magnetic random access memory device of claim 1, wherein the memory cell includes a data storage layer.

3.   (Original) The magnetic random access memory device of claim 1, wherein the memory cell is a spin tunneling device.

4.   (Original) The magnetic random access memory device of claim 1, wherein the memory cell is a giant magnetoresistive device.

5.   (Original) The magnetic random access memory device of claim 1, wherein an electrical current applied to the first and second conductors creates first and second magnetic fields, respectively, in the data storage layer of the memory cell.

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6.   (Original) The magnetic random access memory device of claim of 5, wherein the presence of the first and second magnetic fields is capable of switching the orientation of magnetization of the memory cell.

7.   (Original) The magnetic random access memory device of claim 1, wherein the first and second conductors are electrically insulated from each other.

8.   (Canceled)

9.   (Currently Amended) A magnetic random access memory device comprising:
        an array of toroid-like memory cells, each of the memory cells having an axial opening generally aligned with a first axis; and
        an array of conductors, a portion of each conductor generally aligned with the first axis <u>wherein an electrical current applied to each of a pair of the conductors creates a first magnetic field and a second magnetic field in one of the memory cells that intersects the pair of conductors and creates either the first magnetic field or the second magnetic field in the magnetic memory cells that do not intersect the pair of conductors.</u>.

10.   (Original) The magnetic memory of claim 9, wherein the array of conductors forms intersecting pairs of conductors, and wherein each one of the array of memory cells is positioned at a unique intersection of a pair of the array of conductors.

11.   (Canceled)

12.   (Currently Amended) The magnetic memory of claim ~~11~~<u>9</u>, wherein the first magnetic field and the second magnetic field combine along an angular axis of the toroid-like memory cells to rotate an orientation of magnetization in a data storage layer of the memory cell that intersects the pair of the conductors.

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13.   (Currently Amended) The magnetic memory of claim ~~11~~9, wherein the first magnetic field in the memory cells that do not intersect the pair of conductors is substantially equal to one half of the sum of the first magnetic field and the second magnetic field in the memory cell that intersects the pair of the conductors.

14.   (Currently Amended) The magnetic memory of claim ~~11~~9, wherein the second magnetic field in the memory cells that do not intersect the pair of the conductors is substantially equal to one half of the sum of the first magnetic field of the second magnetic field of the memory cell that intersects the pair of the conductors.

15.   (Currently Amended) The magnetic memory of claim 10, wherein each conductor of the pairs of intersecting conductors has a principal direction of orientation, and wherein the principal direction[s] of orientation of the conductors of each pair of intersecting conductors are orthogonal to each other.

16.   (Original) The magnetic memory of claim 15, wherein the pair of intersecting conductors each include a stepped portion where the conductors are in parallel alignment.

17.   (Withdrawn) A method for improving half-select margin in a magnetic memory, the method comprising the steps of:
        forming an array of toroid-like magnetic memory cells, each memory cell including a data storage layer, and having an axial opening generally aligned along a first axis;
        forming an array of conductors, a portion of each conductor having an angle of orientation that is generally aligned with the first axis.

18.   (Withdrawn) The method of claim 17, wherein the step of forming an array of conductors comprises the step of forming the array so that an electrical current applied to each of a pair of the conductors creates a first magnetic field and a second magnetic field in one of the magnetic memory cells that intersects the pair of the conductors and creates either the first

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magnetic field or the second magnetic field in the memory cells that do not intersect the pair of the conductors.

19. (Withdrawn) The method of claim 18, wherein the combination of the first magnetic field and the second magnetic field combined to rotate the orientation of magnetization in a data storage layer of the magnetic memory cell that intersects the pair of conductors.

20. (Withdrawn) The method of claim 17, wherein the conductors are electrically insulated from each other.